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COMPLETE SPECIFICATION

A Gas-Producing Pyrotechnic Mixture

We, DYNAMIT NOBEL ARTIENGESellschaft, a German Company, of Postfach 114—117, 521 Troisdorf, near Cologne, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a gas-producing pyrotechnic mixture which burns with evolution of a copious volume of gas, particularly for use as a pressure gas-generating propellant composition in cartridges and the like.

Hitherto, in many instances, for example, for expelling a fire-extinguishing substance from a fire extinguisher, cartridges have been used containing a composition which generates a large quantity of gas as it burns. For this purpose it is known to use mixtures containing ammonium nitrate as the main constituent and the reaction velocity thereof is determined by suitable catalytic additives and/or other additives which have the effect of regulating the reaction. The gas volume generated by such mixtures depends on the content of ammonium nitrate, which supplies predominantly gaseous nitrogen and water as a result of the reaction.

In substantial conformity with theoretical calculations, experimental results show that a composition with a high content of ammonium nitrate, for example 78.5% ammonium nitrate, 9.0% potassium nitrate, 6.9% ammonium oxalate and 5.6% potassium dichromate in admixture supplies, per gram of composition, a gas volume of about 200 ml which is available for effective output (all percentages and parts herein being by weight unless otherwise stated). This gas yield is too small for many purposes.

According to the present invention there is provided a gas-producing pyrotechnic composition comprising: from 53.0 to 83.0%

ammonium nitrate, from 6.0 to 9.0% potassium nitrate, from 5.0 to 7.0% ammonium oxalate, from 4.0 to 6.0% ammonium and/or potassium dichromate and from 2.0 to 25.0% of aminotetrazole. Thus the invention, by using a suitable additive in conjunction with a mixture of the type hereinbefore mentioned, provides a composition, of which the reaction generates a substantially larger volume of gas.

Since the gases which are produced are to be as free as possible from carbon oxides for numerous fields of application, compounds having a high content of carbon could not from the outset be considered.

The additive does not disturb the decomposition reaction of the ammonium nitrate, which is catalysed substantially by the dichromate; does not substantially raise the reaction temperature or reduce the reaction velocity; does not appreciably impair the ignitability of the mixture, and is not likely to explode. A specific example of a preferred composition of the invention comprises 15 parts of aminotetrazole added to 85 parts of the ammonium nitrate composition hereinbefore mentioned or the above composition in which the potassium dichromate is replaced by the same percentage of ammonium dichromate. Such compositions result in the production of an increase of about 100% in the gas volume available for effective use.

In addition it has been found that it is possible for some of the aminotetrazole content of the above compositions to be replaced by one or more other nitrogen-containing compounds, such as, for example, dicyandiamide, melamine or a guanidine or guanamine compound. Thus, in a further development of the invention, it is preferred to replace from 5 to 40% of the aminotetrazole content by a mixture of from 2 to 40% of dicyandiamide and from 60 to 98% of aminotetrazole. In this way, it is possible, quite apart from lower

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costs, to influence the burning speed and the burning power without the improvement in gas volume produced being substantially changed.

It is advantageous if all components of the composition have a grain size smaller than 200 μ , since then intimate mixing of the components with one another and consequently the production of a homogeneous mixture is more readily possible, this ensuring that the mixture burns uniformly.

It has also proved advantageous to consolidate the composition, whereby firstly the workability of the mixture is assisted, for example, by the possibility of producing so-called pellets, and secondly an accurately defined burning surface and speed, and consequently a uniform reaction of the mixture, is produced. Pressures up to 2500 kp/cm² are preferably used as consolidation pressure (kp=kilopounds).

WHAT WE CLAIM IS:—

1. A gas-producing pyrotechnic composition comprising: from 53.0 to 83.0% ammonium nitrate, from 6.0 to 9.0% potassium nitrate, from 5.0 to 7.0% ammonium oxalate, from 4.0 to 6.0% ammonium and/or potassium dichromate and from 2.0 to 25.0% of aminotetrazole.

2. A composition according to Claim 1, containing about 15% aminotetrazole.

3. A modification of the composition according to Claim 1 or 2, wherein a portion of the aminotetrazole is replaced by one or more other nitrogen containing compounds.

4. A composition according to Claim 3, wherein from 5 to 40% of the aminotetrazole is replaced by a mixture of from 2 to 40% of dicyandiamide and from 60 to 98% of aminotetrazole.

5. A composition according to any preceding claim, wherein each component of the composition has a grain size less than 200 μ .

6. A composition according to any preceding claim, which is consolidated at a pressure up to 2500 kp/cm².

7. A gas-producing pyrotechnic composition according to Claim 1, substantially as hereinbefore described.

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